

**What is claimed is:**

1           1.    A method of network address port translation  
2    and fast look-up, implemented in a gateway connecting  
3    a virtual network and an external network, wherein the  
4    virtual network comprises at least a server, and the  
5    external network comprises at least a host, comprising  
6    the steps of:  
7           creating a translation table including a  
8           plurality of translation data each provided  
9           with an index and comprising host address  
10          and port information, server address and  
11          port information, and gateway address and  
12          port information, the server address and  
13          port information comprising server internet  
14          protocol(IP) address and port information;  
15          receiving, from the host, a first data packet  
16          comprising first source address and port  
17          information and first destination address  
18          and port information, wherein the first  
19          source address and port information comprise  
20          first source IP address and first source  
21          port information;  
22          searching corresponding translation data of the  
23          first data packet in the translation table;  
24          translating the first source IP address or port  
25          information into a factor related to the  
26          index of the translation data and the first  
27          destination address and port information  
28          into the server address and port information

29           of the corresponding translation data when  
30           the corresponding translation data of the  
31           first data packet is located; and  
32       transporting the first data packet to a  
33           corresponding server according to the server  
34           IP address therein.

1           2. The method as claimed in claim 1, further  
2       comprising the steps of:  
3           receiving a second data packet comprising second  
4           source address and port information and  
5           second destination address and port  
6           information, wherein the second destination  
7           address and port information comprises  
8           second destination IP address and second  
9           destination port information, the second  
10          destination IP address or second destination  
11          port information is a second factor related  
12          to a second index;  
13          acquiring the related second index according to  
14          the second factor and retrieving  
15          corresponding translation data of the second  
16          data packet from the translation table  
17          according to the second index directly;  
18          translating the second source address and port  
19          information into gateway address and port  
20          information of the translation data and the  
21          second destination IP address or port  
22          information into host IP address or port  
23          information of the translation data; and

24           transporting the second data packet to a  
25                   corresponding host according to the IP  
26                   address of the corresponding host.

1           3. The method as claimed in claim 1, further  
2   comprising maintaining a mapping table in the gateway,  
3   storing a plurality of mapping data each comprising  
4   server address and port information and gateway  
5   address and port information.

1           4. The method as claimed in claim 3, further  
2   comprising the steps of:

3           searching related mapping data in the mapping  
4                   table according to the first destination  
5                   address and port information when  
6                   corresponding translation data of the first  
7                   data packet is not located in the  
8                   translation table;

9           adding new translation data assigned with a third  
10                   index in the translation table, which  
11                   comprises the searched mapping data and the  
12                   first source address and port information;

13           translating the first source IP address or port  
14                   information into a factor related to the  
15                   third index and first destination address  
16                   and port information into server address and  
17                   port information of the searched mapping  
18                   data; and

19           transporting the first data packet to a  
20                   corresponding server according to the IP  
21                   address of the corresponding server.

1           5.    A method of network address port translation  
2    and fast look-up, implemented in a gateway connecting  
3    a virtual internal network and an external network and  
4    comprising a mapping table, wherein the virtual  
5    internal network comprises at least a server, the  
6    external network comprises at least a host, and the  
7    mapping table stores private internet protocol(IP)  
8    address and private port information of each server,  
9    gateway IP address, and gateway port information,  
10   comprising the steps of:

11           creating a translation table comprising a  
12           plurality of translation data each provided  
13           with an index and containing host IP  
14           address, host port information, server  
15           private IP address, server private port  
16           information, gateway IP address, and gateway  
17           port information;

18           receiving, from the host, a first data packet  
19           comprising source IP address, source port  
20           information, destination IP address, and  
21           destination port information, wherein the  
22           source IP address and the source port  
23           information comprise an IP address and a  
24           port number of the host transporting the  
25           first data packet, and the destination IP  
26           address and the destination port information  
27           comprise an IP address and a port number of  
28           the gateway;

29        searching corresponding translation data of the  
30                first data packet in the translation table;  
31        translating the source IP address or source port  
32                information into a factor related to the  
33                index of the translation data and the  
34                destination IP address and destination port  
35                information into the server private IP  
36                address and server private port information  
37                of the server when the corresponding  
38                translation data of the first data packet is  
39                located; and  
40        transporting the first data packet to a  
41                corresponding server according to the  
42                translated destination IP address  
43                information therein.

1        6.    The method as claimed in claim 5, further  
2        comprising the steps of:  
3                receiving, from a server, a second data packet  
4                comprising a source IP address and source  
5                port information and a destination IP  
6                address and destination port information,  
7                wherein the source IP address and source  
8                port information comprise server private IP  
9                address and port information, the  
10                destination IP address comprises a host IP  
11                address, and the destination address or  
12                destination port information is a second  
13                factor related to a second index;

14 acquiring the related second index according to  
15 the second factor and retrieving  
16 corresponding translation data of the second  
17 data packet from the translation table  
18 according to the second index directly;  
19 translating the destination IP address or  
20 destination port information into the host  
21 IP address or host port information of the  
22 host transporting the first data packet and  
23 the source IP address and source port  
24 information of the second data packet into a  
25 IP address and port information of the  
26 gateway; and  
27 transporting the second data packet to the host  
28 according to the destination IP address.

1 7. The method as claimed in claim 5, further  
2 comprising the steps of:  
3 searching a corresponding server private IP  
4 address and port information in the mapping  
5 table according to the destination IP  
6 address and port information when the  
7 corresponding translation data of the first  
8 data packet is not located in the  
9 translation table;  
10 adding new translation data assigned with an  
11 index in the translation table, which  
12 comprises the searched private IP address,  
13 the searched port information, the source IP  
14 address, the source port information, the

15 destination IP address, and the destination  
16 port information;  
17 translating the source IP address or the source  
18 port information into a factor related to  
19 the corresponding index and the destination  
20 IP address and the destination port  
21 information into corresponding server  
22 private address and server port information  
23 of the searched mapping data; and  
24 transporting the first data packet to a  
25 corresponding server according to the new  
26 destination IP address and destination port  
27 information.

1 8. A network address port translation (NAPT)  
2 gateway connecting a virtual network and an external  
3 network, comprising:  
4 a translation table comprising a plurality of  
5 translation data each provided with an index  
6 and comprising host address and port  
7 information, server address and port  
8 information, and gateway address and port  
9 information, wherein the server address and  
10 port information comprising server internet  
11 protocol(IP) address information and port  
12 information;  
13 a receiving unit receiving, from the host, a  
14 first data packet comprising first source  
15 address and port information and first  
16 destination address and port information,

17                wherein the first source address and port  
18                information comprises first source IP  
19                address and first source port information;  
20        a    processing unit searching corresponding  
21                translation data of the first data packet in  
22                the translation table and translating the  
23                first source IP address or first source port  
24                information into a factor related to the  
25                index of the translation data and the first  
26                destination address and port information  
27                into the server address and port information  
28                of the corresponding translation data when  
29                the corresponding translation data of the  
30                first data packet is found; and  
31        a    transporting unit coupling with the processing  
32                unit and transporting the first data packet  
33                to a corresponding server according to the  
34                server IP address therein.

1            9.    The gateway as claimed in claim 8, wherein  
2            the receiving unit receives, from a server, a second  
3            data packet comprising second source address and port  
4            information and second destination address and port  
5            information, wherein the second destination address  
6            and port information comprises second destination IP  
7            address and port information, and the second  
8            destination IP address or destination port information  
9            is a second factor related to a second index;

1            10.   The gateway as claimed in claim 9, wherein  
2            the processing unit acquires the related second index



3 according to the second factor and retrieves  
4 corresponding translation data of the second data  
5 packet from the translation table according to the  
6 second index directly and translating the second  
7 source address and port information into gateway  
8 address and port information of the translation data  
9 and the second destination IP address or destination  
10 port information into host IP address or port  
11 information of the translation data.

1 11. The gateway as claimed in claim 10, wherein  
2 the transporting unit transports the second data  
3 packet to a corresponding host according to the IP  
4 address thereof.

1 12. The gateway as claimed in claim 8, wherein  
2 the host address and port information comprises a host  
3 IP address and host port information, and the gateway  
4 address and port information comprises a gateway IP  
5 address and gateway port information.

6 13. The gateway as claimed in claim 8, further  
7 comprising:

8 a mapping table storing a plurality of mapping  
9 data each comprising server address and port  
10 information and gateway address and port  
11 information;

12 wherein the processing unit searches related  
13 mapping data according to the first  
14 destination address and port information,  
15 adding third translation data provided with

16           a third index in the translation table,  
17           which comprises the searched mapping data  
18           and the first source address and port  
19           information, and translating the first  
20           source IP address or first source port  
21           information into a factor related to the  
22           third index when the corresponding  
23           translation data of the first data packet is  
24           not located.

1           14. The gateway as claimed in claim 13, wherein  
2           the server address and port information comprises a  
3           server IP address and server port information, and the  
4           gateway address and port information comprises a  
5           gateway IP address and gateway port information.